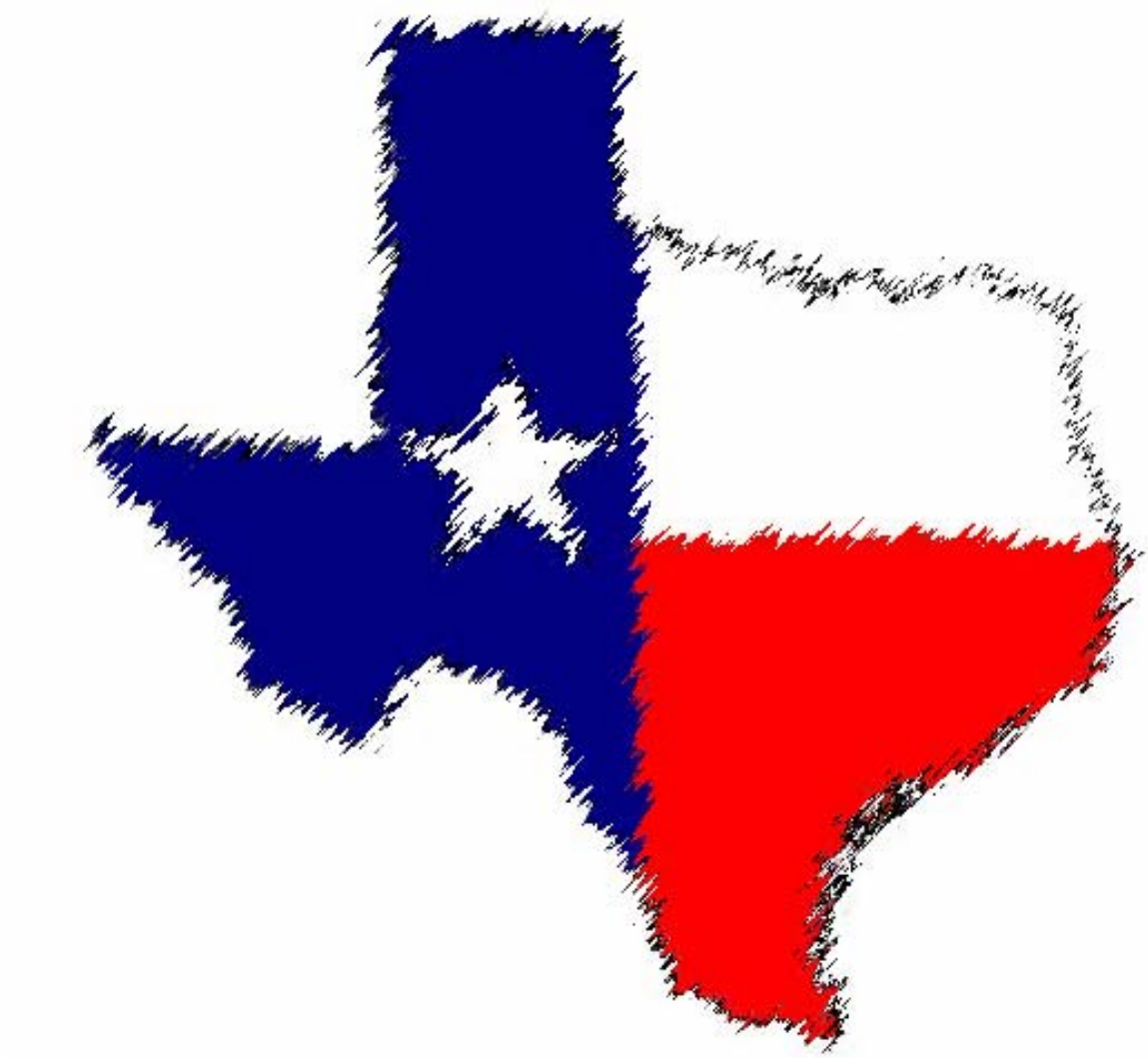
Texas Fire Weather Operating Plan

2005-2006



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Texas Fire Weather Operating Plan

National Weather Service
U.S. Dept of Commerce

NWS Southern Region Headquarters
819 Taylor Street, Room 10A06
Fort Worth, TX 76102

Document Prepared by:
Monte Oaks
Austin/San Antonio NWS Office
2090 Airport Road
New Braunfels, TX 78130

NWS Signatories:
Monte Oaks
Austin/San Antonio NWS Office

Paul Witsaman
NWS Southern Region Headquarters

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For their contributions and guidance in the preparation of this plan, a special thanks is given to...

Cynthia Foster (TICC/TFS, Lufkin),
Tom Spencer (TFS, Huntsville),
Paul Witsaman (NWS SRH, Fort Worth),
Chuck Maxwell (SWACC Predictive Services, Albuquerque, NM),
Denver Ingram (SACC Predictive Services, Atlanta, GA),
Bill Adams (NWS, Shreveport),
Dennis Cain (NWS, Fort Worth),
Joe Goudsward (NWS, Little Rock)

TEXAS FIRE WEATHER OPERATING PLAN
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I. INTRODUCTION

The Texas Fire Weather Operating Plan (TX-FWOP) is a consolidated document of all services provided by National Weather Service (NWS) offices for the state of Texas. This consolidation is necessary in order to improve efficiency between the 13 NWS offices and their respective customer agencies as the NWS migrates toward more standardized services over the next several years. Some NWS offices may use this plan as a Local Area Operating Plan (LAOP), while other offices, especially those with responsibilities overlapping other states, will have a separate plan.

Structure and Content

The TX-FWOP is organized into 3 basic components. This first section provides an overview of the operating plan, an action plan for making revisions, and a summary of the most recent revisions. The second section provides an outline of general NWS policies and services as well as the specific products and services from each NWS office serving Texas. The final component is a collection of references such as glossary, web links, and contacts.

A. SIGNATORIES AND DOCUMENT REVISION

In order for this NWS document to represent the interests of a variety of fire weather customers, a list of signatories will be agreed upon each year. Both the NWS and the customer agencies will select signatories representing their respective agencies.

This operating plan will be a living document to reflect changes to NWS policies and references as this information is coordinated with agency signatories through meetings and/or workshops. Routine annual revisions are generally planned and published during minimal wildfire activity which is usually in the spring months for Texas. However, any portion of this document may be altered at any time as needed. In the event this is necessary, affected agencies will be notified, and a brief notation of each revision is included at the end of this introduction section.

NWS Signatories

The chief editor and NWS signatory for this edition of the TX-FWOP is Monte Oaks (Fire Weather Program Leader, NWS Austin/San Antonio). The Regional Fire Weather Program Leader, Paul Witsaman, will act as a backup signatory. Questions or concerns regarding this operating plan should be sent to sr-srh.txfwop@noaa.gov.

Customer Agency Signatories

Agency signatories representing the land management customers of fire weather products are listed in *Appendix 6: Agency Signatories*. These signatories will be designated on an annual basis. Requested changes to the Texas Fire Weather Operating Plan should be made in cooperation with at least one of these agency signatories. Local NWS office policy change requests can be made without coordinating with NWS signatories (additional details in *Section II.B. Coordination and Dissemination*); NWS office personnel can submit any relevant policy changes to the NWS Signatories to be included into future operating plan updates. Requests for new

signatories or changes to existing signatories should be in cooperation with all agency signatories.

B. RECENT UPDATES

All updates will be reviewed by signatories. Draft revisions will need signatory approval before the updates are published. This section will summarize any update necessary for signatory review in the past 12 months. A summary of typographical error revisions is not required unless they play a significant role on policy or procedures.

8/13/05:
Changes to CRP red flag criteria/NFDRS site

8/12/05:
Subtle changes to services offered by WFO AMA and WFO MAF
Activated links to D-1 Form and TXFWOP email contact, and updated MIC contacts for SHV and CRP

5/14/05:
Changes reflect input from the phone conference held between the NWS and customer agencies on 2/14/05 and email correspondence between NWS offices in February. Significant changes include:

EMAIL FEEDBACK FOR SPRING REVISION:
NWS FTW: Typos corrected for Fort Worth (RFD identifier and Comanche)
NWS AMA: Typo for Meredith; AMA RFW criteria changed to reflect other offices served by SWACC; added RFD section; change low level HI to mid level HI in AMA FWF section
NWS LUB: FWF error in AOP general section corrected—some offices issue product once per day; LUB RFD statement discontinued
NWS EPZ: change of EPZ FWF seasonal info; add mention of IMETs serving Texas
USFWS: For BRO section add Palo Alto NHS (NPS) and Lower Rio Grande Valley NWR to the list of federal agencies
TFS: Tom Spencer location change

5/14/05 FEBRUARY TELE-CONFERENCE FEEDBACK:
TFS: Add Liaison to State of TX to EWX services; need a structured summary of RFW criteria
USFS: Add phrase encouraging Spot Requests to be within a few hours of current time.
EWX et al: Add individual office coverage of NFDRS services; add product format structure; add a generic email account for feedback to NWS; identify NWS and customer agency signatories

2/10-14/05:
Numerous changes since the document was last active in 2002. Signatories were identified on 2/14/05 and were able to make suggestions for a second draft. Significant changes in first draft of the 2005 version since previous issuance include:

-Overall document structure
-New formats
-NFDRS program implementation
-Revised spot forecast guidance with NWS Spot
-New guidance on special services

II. NWS FIRE WEATHER SERVICES

NWS MISSION
"The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community. "

This NWS mission is accomplished through the issuance of warnings and forecasts targeting primarily the general public. However, through an Interagency Agreement for Meteorological Services established between the NWS and wildland fire agencies, these warnings and forecasts have been extended to support specific land management and fire protection activities.

A. NATIONAL WEATHER SERVICE ORGANIZATION

Based on the interagency agreement, national standards for fire weather forecast products and services are established in the NWS Directives System (NDS). These guidelines are then applied to local agreements set for in local Area Operating Plans such as the TX-FWOP.

To accomplish the NWS mission, NWS offices are staffed continuously by personnel that include one or more professional meteorologists trained in fire weather. Each office provides a specified level of fire weather service based upon requirements established by the fire agencies.

To ensure acceptable two-way communication between the core forecast staff and the various fire agencies, each NWS office has a designated individual with special knowledge and training to serve as the Fire Weather Program Leader (FWPL). These meteorologists coordinate the majority of the liaison and administrative activities that are vital in maintaining a close working relationship with the fire community. Coordination responsibilities include policies pertaining to forecast products and services, fire weather forecast training, and familiarization meetings between the NWS and the customers of fire weather services.

On-site fire weather support is also available through a network of Incident Meteorologists (IMETs). IMETs are strategically positioned at NWS offices across the country and can be requested through the Staff Meteorologist at the National Interagency Fire Center (NIFC). Additional information on obtaining IMET services will be provided in *Section II.E. Specialized Services*.

B. COMMUNICATION AND DISSEMINATION

Fire weather forecast products from the NWS are transmitted through the Advanced Weather Interactive Processing System (AWIPS). These products are automatically routed into the US Forest Service's Weather Information Management System (WIMS). While the NWS has responsibility to ensure successful transmission through AWIPS and its communications subsystems to the Telecommunications Gateway (TG), it maintains no control over the operation of WIMS.

Most fire weather products are available on the Internet; however, the Internet is not necessarily the most reliable means of distribution. While fire weather watches, red flag warnings and spot forecasts are most accessible on NWS office websites, a backup means of dissemination should be available to wildland fire agencies through facsimile, electronic mail, or other methods. User agencies should coordinate with program leaders from each NWS office on which means of dissemination are available.

Each NWS office should have a coordination method to communicate red flag product (RFW) information with the Texas Interagency Coordination Center (TICC). Since most land management operations are inactive during nights and weekends, forecasters are advised to use fire danger assessments from the Texas Forest Service (available at http://webgis.tamu.edu/) with the categories of "HIGH" and "EXTREME" for providing the validation needed for issuing an RFW product.

RFW products can be tracked by land management agencies on the National Fire Weather Page provided by NWS Boise, ID at http://fire.boi.noaa.gov.

TICC also provides communication and documentation services to the NWS offices in the handling of spot forecast requests and wildfire events. Spot forecast requests from non-federal agencies should be coordinated with TICC if at all possible.

User agencies requesting a change of service or special services from a particular weather office should submit a formal request to the Meteorologist-in-Charge (MIC) of the respective NWS office. Queries regarding procedural matters, details of the fire weather program or equipment, special operational needs, et cetera, should be addressed to the program leader of the appropriate NWS office, or to that office's MIC. A list of each FWPL and MIC of the NWS offices serving Texas are listed by office in *Section II.F.NWS Weather Forecast Offices.*

C. FORECAST PRODUCTS

All National Weather Service offices serving the state of Texas will issue a core suite of fire weather products as indicated in the NDS consisting of the following:

1) Fire Weather Planning Forecasts
2) Fire Weather Watches and Red Flag Warnings
3) Spot Forecasts
4) National Fire Danger Rating System (NFDRS) Forecasts

All NWS offices serving Texas are also encouraged to address fire weather issues in other forecast products such as Hazardous Weather Outlooks and Area Forecast Discussions. These additional products are designed to alert emergency managers, land management agencies, and the media to threatening weather conditions, including those which enhance the spread of wildfires.

At the discretion of NWS offices, optional fire weather products such as smoke management forecasts and fire danger statements are available to serve local needs. Discussion of locally defined fire weather products will be addressed as individual office services in *Section II.C.5. Supplementary Products*.

1. Fire Weather Planning Forecasts (FWF)

Fire weather planning forecasts are available to anyone with an interest in land management and pre-suppression activities in Texas.

Issuance Times:
These forecasts are issued at least once per day—usually in the early morning. Many offices issue a routine afternoon update. FWF issuance times for each NWS office will be determined by local agreements.

Content:
Routine fire weather forecast content should include...

-A headline to emphasize a red flag warning or a significant change in weather conditions,
-Weather synopsis or map discussion,
-Predictions of sky cover and weather, temperature, humidity, and wind, and thunderstorms and/or precipitation, and
-An outlook or extended forecast through at least 5 days.

Each NWS office determines which optional forecast parameters to include in their forecasts based on customer feedback. Details on required and optional forecast parameters are provided in *Section II.D*.

Format:
There are two valid FWF formats outlined by the NDS – narrative and tabular. Details on format and content of fire weather planning forecasts issued by each office can be found in *Section II.F*.

2. The Red Flag Program (RFW)

The intent of the red flag program is to provide land management agencies with appropriate notification of the likelihood that weather conditions associated with the outbreak of wildfire will occur. Identification of red flag events is a primary responsibility of the forecaster producing the fire weather forecasts. Forecasters will issue a fire weather watch or red flag warning, based on the criteria and timing explained below. Some offices will issue individual products under the product identifier RFW while others will simply highlight the information in the routine fire weather forecast.

a. Criteria

Red flag criteria are dependent on both weather forecasts provided by NWS offices and the fuel moisture and fire danger assessments provided by land management agencies. The weather criteria for fire weather watches and red flag warnings across Texas will vary with each NWS office's county warning area based on the vegetation, topography, and distance from the Gulf of Mexico. Red flag criteria used at individual NWS offices can be found in *Section II.F* and summarized for the Texas offices in *Section III. Appendix 1*.

NWS forecasters should utilize the fuel moisture and fire danger assessments from the Internet provided jointly by the Texas Interagency Coordination Center and the Texas Forest Service. These assessments will usually be no more than a few days old; however, if forecasters feel the data provided is unrepresentative of the current situation, they should attempt coordination by phone to the TFS and/or TICC.

i. Fire Weather Watch

Fire weather watches are issued to alert fire and land management agencies to the possibility of red flag conditions beyond the first forecast period (12 hours). The watch is issued generally 12 to 48 hours in advance of the expected conditions, but can be issued up to 72 hours in advance if the forecaster is reasonably confident. The term "fire weather watch" will be headlined in the routine fire weather forecast and/or issued as a special forecast. The watch will remain in effect until it expires, is canceled, or upgraded to a red flag warning.

ii. Red Flag Warning

A red flag warning is used to alert fire and land management agencies that red flag conditions exist or are imminent. A red flag warning will be issued immediately when there is high confidence that red flag criteria will occur within the next 24 hours, or if those criteria are already being met (Due to forecast uncertainty beyond 12 hours, a fire weather watch will be more often used in the 12 to 24 hour time frame.) When a warning is issued, the term "red flag warning" will be headlined in the routine fire weather forecast, and/or sent as a special forecast to inform users of the warning. The warning will be continued on subsequent forecasts until no longer valid. A cancellation

statement (using the RFW product) should terminate the warning unless the previous message indicated a termination time.

b. Dissemination

The dissemination of the RFW should reflect local user capabilities to provide the most efficient means of getting watches/warnings to the appropriate fire suppression personnel. Fire Weather Watch/Red Flag Warning dissemination methods may need to become more detailed in future versions of the TX-FWOP.

c. Format and Valid Times

RFW format and valid times will conform to the guidelines given in the NDS.

3. Spot Forecasts (FWS)

Spot forecasts are specially requested site-specific forecasts for wildfires, prescribed burns, HAZMAT incidents, search and rescue operations, aerial spraying, and other functions of the land management community. By being site-specific, these forecasts take into account the effects of topography, vegetation and any nearby bodies of water. Based on the request, spot forecasts can contain site-specific forecast information on sky condition, precipitation and thunderstorm probability, maximum and minimum temperature and humidity, wind speed and direction, and timing of weather changes. Due to limited resources, spot forecast requests are subject to certain restrictions as indicated below.

Who can request a spot forecast?

Under the terms of the Interagency Agreement for Meteorological Services (NDS: 10-406), the NWS will provide spot forecast services upon request of any federal, state, tribal, or local official who represents a spot forecast for wildfire support. For non-wildfire purposes, resources permitting, WFOs will provide spot forecast services under the following restrictions:

A. Upon request of any federal official who represents that the spot forecast is required under the terms of the Interagency Agreement for Meteorological Services (NDS:10-406).

B. Upon request of any state, tribal, or local official who represents that the spot forecast is required to carry out their wildland fire management responsibilities in coordination with any federal land management agency participating in the Interagency Agreement for Meteorological Services (NDS: 10-406).

C. Upon request of any public safety official who represents the spot forecast is essential to public safety, e.g. due to the proximity of population centers or critical infrastructure. A “public safety official” is an employee or contract agent of a government agency at any level (federal, state, local, tribal, etc.) charged with protecting the public from hazards including wildland fires of whatever origin and/or other hazards influenced by weather conditions such as hazardous material releases.

Although anyone can act as a “public safety official” in the event of a fire or hazardous material related incident, it is best to coordinate a spot request

through TICC or other federal, state, or local officials if available. Duplication of requests over the same incident could result in confusion or loss in response time. It is also important that non-federal agencies indicate a wildfire or other related public safety hazard as the reason for their request.

Availability
Spot forecasts are available upon request 24 hours a day, seven days a week, including holidays. Requests for spot forecasts will be serviced by at least one trained meteorologist. These requests will be completed as soon as possible and should normally take 30 minutes or less. However, protection agencies should be aware that other duties (such as severe weather) may take higher priority, and short delays may occur. If excessive delays are encountered, please notify the appropriate NWS office. Indication of a wildfire or other public safety threat in the request will ensure a more timely response.

Request and Dissemination Methods
Nearly all spot forecast requests are sent to the National Weather Service through an Internet program called NWS Spot. Requesting officials should consult with the appropriate NWS office for instructions on how to use this program. Each NWS office website should include a NWS Spot tutorial in the "Fire Wx" section of the homepage. Completed spot forecasts requested through NWS Spot (for both wildfire and non-wildfire purposes) are available to everyone with access to the Internet.

Requesting officials without Internet access may also fax a form titled "Fire Weather Special Forecast Request" or otherwise known as "WS Form D-1". However, these requests must be accompanied by a phone call directly to the NWS forecast operations area in order to notify the appropriate office of the incoming fax request. Blank copies of these forms can be retrieved from the Internet at http://www.srh.weather.gov/srh/cwwd/msd/firewx/images/D1-V2005.pdf or faxed by request from any NWS Office. Once a faxed spot forecast request is fulfilled, NWS offices are encouraged to send a copy of the completed D-1 form to TICC for documentation purposes. For additional coordination and dissemination details, see *Section II.B.*

As a final resort, site-specific weather information can also be requested over the phone from NWS forecasters. This means of communication is inefficient for significant amounts of weather information.

Non-federal requesting officials should coordinate spot forecast requests with TICC using the guidelines given above and in the NDS.

Format
Spot forecast formats may vary in order to provide the best possible services to requesting agencies. However, requests supporting wildfires or other public

safety threats must follow the general guidelines as indicated in NDS for spot forecasts.

Quality Control
In order to make sure that spot forecasts are as accurate as possible, NWS offices are strongly encouraged to develop local verification schemes. To assist in this effort, the NWS asks that each spot forecast request be accompanied by a preliminary observation (recorded at the time of the request) and a follow-up observation (recorded at the time of maximum or minimum heating depending upon the time that the request was sent) at the burn site, if possible. User agencies should also understand that preliminary observations are critical to giving the spot forecast a significant improvement from the routine fire weather forecast.

Spot forecasts are not intended to be used as a general planning tool for the following day. The fire weather planning forecast already provides this information and can be augmented by direct phone consultation with a forecaster on duty at the appropriate NWS office. Spot forecasts are intended to support ongoing or imminent wildfire or federal prescribed burn activity only. Requests supporting prescribed burn activities should typically be sent within 12 hours of the projected ignition time, and are most effective when sent within 4 hours of the ignition time.

4. National Fire Danger Rating System Forecasts (FWM)

The National Fire Danger Rating System is an assessment of wildfire danger at key points throughout the United States. “Fire danger” in NFDRS parlance, means a daily evaluation of the potential for wildfire ignition, growth and intensity over a broad sampling area. NFDRS takes into account many different vegetative types throughout the United States, their annual growth cycles, seasonal climate trends, local topography, fuels, and the effect of daily weather changes. Fire managers receive numeric output that suggests the severity of fire danger.

In general, one or more fire weather observation sites are carefully located in the forest that will represent the worst conditions. Observations are taken once per day. Ideally, the NFDRS weather observations are taken at the hottest, driest and windiest time of the afternoon. This is because NFDRS is supposed to model the “worst case” fire conditions possible during the day. The ideal site would be one on a south and west facing aspect with no nearby obstructions. In reality, few locations meet these stringent criteria. The NFDRS is not intended to be “site specific” like the Fire Behavior Prediction System but rather a general overview of fire danger. Effective fire suppression planning depends heavily on NFDRS because it is an objective tool for predicting the difficulty of suppressing a wildfire.

The National Weather Service role in NFDRS is forecasting weather trends, allowing the NFDRS to predict the next day’s fire danger indices. Daily weather observations entered into the NFDRS by the fire agencies form the basis of the trend forecast

input by the NWS. NFDRS reporting sites are usually RAWS (Remote Automated Weather Station) stations whose weather information is available through WIMS (Weather Management and Information System) and other Internet sites. The basic time of observation each day is 1300 Local Standard Time or 1400 Local Daylight Time. Observations for a given station are reviewed by the station owner who transmits the quality controlled observations into WIMS between 1330 and 1400 Local Standard Time or between 1430 and 1500 Local Daylight Time. At a set time of day, WIMS automatically formats these reports into an FWO collective product created for each WFO. Each NWS office will issue the NFDRS forecast as an FWM product based on the reception of this FWO collective. When a forecast office does not receive the FWO observation collective in AWIPS, it is not required to issue a FWM forecast for that day, meaning the forecast fire danger indices will not be generated for the next day.

Format:
The NFDRS (FWM) forecast consists of two separate and distinct parts. The first part is a time specific forecast for the basic time of observation (1300 Local Time). The second part is a forecast for certain parameters during the 24 hours between the basic observation time on the day the forecast is being prepared and the basic observation time for the following day. The single station forecast is in tabular form with the terminology as follows:

1. **State of Weather:** The state of weather expected at basic observation time the next day is input as a code, based on the following table. Forecasters will select the highest code when more than one type of weather is expected. For example, if both fog and rain are anticipated at basic observation time, the state of weather would be coded as six, the higher state of weather code.

Weather Codes for Single Station Forecasts

Weather Code	Sensible Weather
0	Clear Skies
1	Scattered Clouds
2	Broken Clouds
3	Overcast Conditions
4	Fog
5	Drizzle
6	Rain
7	Snow
8	Showers
9	Thunderstorms

2. Temperature and humidity: The forecaster will enter the expected temperature in degrees Fahrenheit, and the relative humidity in whole percent expected at basic observation time.

3. Wind direction and speed: The forecaster will enter the expected wind direction in degrees and the expected wind speed in mph at the observation site. The wind speed at a fire weather station is the average of the speed measured over a 10-minute period. Wind speeds measured at a fire weather station usually do not compare with the ASOS ten meter winds measured at airports. Wind speeds are observed to be lower over the rougher terrain of a forest as compared to the observation site at an airport. The 10 minute average wind at the 20 foot level will produce lower wind speeds than the 2-minute ASOS winds. The forecast wind speed will reflect the lower wind speeds at fire weather stations by reducing the forecast wind speed by a factor that is currently 70%.

4. 24 hour forecasts: The forecaster will follow the basic observation time forecasts with the maximum temperature expected during the 24 hour period from basic observation time the day the forecast is being prepared to the basic observation time the following day. This is followed by a forecast of minimum temperature, maximum humidity and minimum humidity expected in the same 24-hour time frame.

5. Precipitation time duration: The forecaster will next enter the expected duration of precipitation in whole hours that will fall at the site for the first 16 hours of the forecast between basic observation times. This 16 hour forecast will be followed by a forecast of the expected duration of precipitation in whole hours that will fall at the site for the final eight hours of the forecast between basic observation times.

6. Wet Fuels Condition: A wet fuels condition anticipated at the next basic observation time is entered next. If the forecaster expects fuels to be wet at the next basic observation time, a Y for yes will be entered. If the forecaster feels fuels will not be wet at the next basic observation time, an N for no will be entered. Basically, this parameter will be yes when liquid water, ice or snow, will be sitting on the fuels at observation time, i.e. really soaked! Y should be used with caution; all indices in the NFDRS are set to zero when wet fuels are forecast.

5. Supplementary Products

The following products below are not necessarily issued as a part of the Interagency Agreement for Meteorological Services but are issued based on the guidelines from the NDS:

a. Hazardous Weather Outlooks

In times when wildfire activity is expected to threaten lives or property, NWS offices are encouraged to issue Special Weather Statements under the heading of Hazardous Weather Outlook. The decision of when to issue this product is left to the discretion of each forecaster as well local NWS office policies. The NWS is restricted from using the words “red flag warning” or “fire weather watch” in products distributed to the general public. Additionally, user agencies have requested that the phrase “fire danger” should be avoided unless it references the assessments provided by the Forest Service.

b. Fire Danger Statements

Fire Danger Statements are issued on an as needed basis, when there is either a very high or extreme fire danger. These conditions are determined and are based on stage of vegetation, expected afternoon high temperature, afternoon minimum relative humidity and daytime wind speed. Also included in the product are any burn bans that may be in effect.

c. Area Forecast Discussions

Area Forecast Discussions are technical discussions used to coordinate weather information to other Weather Forecast Offices and customers of NWS forecasts. This product is most useful for customers to assess the confidence level applied to a given forecast. Forecasters are encouraged to include fire weather sections in these discussions -- especially when weather parameters approach critical values.

D. Weather Parameters used in NWS products

This section will provide details on the various fire weather forecast parameters used in the fire weather forecast products issued by NWS offices serving Texas. These parameters include both those required in the Interagency Agreement for Meteorological Services and those required based on local agreements. Parameters for NFDRS forecasts are discussed separately in *Section II.C.4*. NWS offices are obligated to provide user agencies with units of measure and/or a legend to explain ambiguous weather parameters.

1. Weather Synopsis

The FWF, RFW, and FWS products typically begin with a narrative synopsis of significant weather features. The discussion focuses on mainly changes in the weather that will impact fire behavior. Drastic weather changes such as fronts, drylines and other wind shifts, and timing of precipitation and thunderstorms are the most critical services the NWS provides. As a result, these forecast elements are recommended to be addressed in a headline statement or inserted at the beginning of the synoptic discussion. Other parameters expanding on the character of weather (such as a long period of showers, freezing precipitation or a heavy rain event) are also addressed in this discussion. Offices are encouraged to use this qualitative discussion to help customers assess the expected time that a temperature inversion will break.

2. Precipitation and thunderstorms

Rain chances are expressed in most NWS forecast products as a percent chance that a given location will receive 0.01 inches of precipitation for a 12 hour period. Forecasters are also encouraged to evaluate the likelihood of a wetting rain in the synopsis portion of the forecast, which is considered to be 0.10 inches for most, if not all of Texas. A wetting rain is a widespread rain that over an extended period of time significantly reduces fire danger. NWS fire weather program leaders should ensure their user agencies understand how a wetting rain is discussed in the forecast. Note: NWS offices needing to decide on specific values to assign to wetting rains for their CWFA should consult with nearby fire behavior specialists. When thunderstorms are expected, forecasters are encouraged to describe the type of weather that can be expected in or near thunderstorms, i.e. heavy rains, outflow boundaries, dry lightning, etc., in the narrative section of the forecast. This is typically done in the weather synopsis.

3. Sky condition

Sky condition is usually part of a tabular forecast in terms of percent coverage or a qualitative description based on percent coverage. Sky condition trends may also be discussed qualitatively in the synopsis of a forecast to give the customer a better understanding of how other weather variables will be affected. Sky condition trends may also be described in a tabular assessment expressed as a daily percentage or total minutes of sunlight for the day.

4. Other weather phenomena

Smoke, fog, and dust expected to create significant problems for wildfire control efforts should be included in the synopsis of the forecast. Severe weather, winter weather, and flash flood events are unlikely to occur during extreme wildfire events but could still be of interest to the user agencies for wildland planning efforts. Some of these parameters may be used in a tabular description for “weather”.

5. Relative Humidity

Relative humidity is the ratio (expressed in %) of the amount of water vapor actually in the air compared to the amount the air is capable of holding at its temperature and pressure. Since relative humidity values are also critical to fire management activities, they should always be included in routine and spot forecasts. Relative humidity values can vary greatly over a small area due to variations in topography, vegetation and location with respect to bodies of water. Therefore, a range of values will often be used in routine fire weather forecasts, but forecasters should make an attempt to narrow this range when making Spot Forecasts.

6. Winds and Mixing

Wind speed and direction are generally indicated for the most hazardous part of the day or at other times specified in the forecast. The NDS requires that users of fire weather forecasts are made aware of the level for which the wind is forecast, i.e., eye-level, 20 feet, free-air, etc. Maximum gusts, erratic winds, and wind shifts should be mentioned when expected. The three most common wind assessments are listed below.

20-foot winds

Winds at 20 feet above the ground or above the average height of vegetation are the most common winds used in the routine fire weather forecast. Since most surface stations used for NWS forecasts measure the wind at 33 feet, a reduction factor is needed to arrive at the 20-foot wind. FTS/RAWS sites, which measure 20 foot wind speed and direction, can be used to compare the 33 foot winds, but are available for only a few NWS offices with responsibilities in Texas.

Eye-level winds

Eye-level (or 6-foot) winds are often used for spot forecasts to compliment preliminary reports taken at the burn site. These wind forecasts may also be estimated using a reduction factor to the available surface wind data.

Transport winds / ventilation index

Average winds in the mixing layer and the depth of the mixing layer are parameters that are helpful for land management agencies to evaluate the potential for very large fires and also for smoke dispersal. Data computed from morning atmospheric soundings and model forecast soundings are used to provide ventilation values for periods of maximum heating. The following are terms and definitions necessary to understanding ventilation data and values:

Mixing height or mixing depth
The height to which vigorous mixing occurs due to heating. Units are in feet above ground level (AGL), with ground level being the elevation above mean sea level (MSL) of the upper-air site. It is important that wildland fire managers note the difference in elevation between the burn site and the referenced upper-air site, and modify the provided mixing depths accordingly.

Transport Winds
A measure of the average rate of horizontal transport of air within the mixing layer. Units can be expressed in knots (1 knot = 1.15 mph) or mph. An average wind direction (the direction from which the wind is blowing) is provided. If winds are light and variable, then it may be best to consider local drainage effects when in critical situations.

Ventilation Index
The product of the mixing height and the transport wind speeds. It is a measure of the volume rate of horizontal transport of air within the mixing layer per unit distance normal to the winds. Units are in knot-feet. As a guide, the following categories have been established to describe the ventilation...

Excellent	150,000 kt-ft or greater
Very Good	100,000-149,999 kt-ft
Good	60,000-99,999 kt-ft
Fair	40,000-59,999 kt-ft
Poor	less than 40,000 kt-ft

When ventilation values are less than 40,000 kt-ft along with transport winds of less than 7.0 knots, dispersion of any pollutants released into the atmosphere will be severely limited.

7. Lightning Activity Level

LAL	Cloud & Storm Development	Individual storm cell cloud-to-ground (cg) lightning discharges			
		Areal Coverage	Counts cg / 5 min	Counts cg / 15 min	Average cg / min
1	No thunderstorms	n/a	n/a	n/a	n/a
2	Cumulus clouds are common but only a few reach the towering stage. A single thunderstorm must be confirmed in the rating area. The clouds mostly produce virga but light rain will occasionally reach ground. Lightning is very infrequent.	<15%	1-5	1-8	<1
3	Cumulus clouds are common. Swelling and towering cumulus cover less than 2/10 of the sky. Thunderstorms are few, but 2 to 3 occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.	15% to 24%	6-10	9-15	1-2
4	Swelling cumulus and towering cumulus cover 2-3/10 of the sky. Thunderstorms are scattered but more than three must occur within the observation area. Moderate rain is commonly produced, and lightning is frequent.	25% to 50%	11-15	16-25	2-3
5	Towering cumulus and thunderstorms are numerous. They cover more than 3/10 and occasionally obscure the sky. Rain is moderate to heavy, and lightning is frequent and intense.	>50%	>15	>25	>3
6	Dry lightning outbreak. (LAL of 3 or greater with majority of storms producing little or no rainfall.)	n/a	n/a	n/a	n/a

8. Haines Index

The Haines Index (HI) is a numerical value that indicates the potential for large wildfires to experience extreme fire behavior (i.e. crowning, spotting, and rapid rates of spread). The HI combines both the instability and dryness of the air by examining the lapse rate between two pressure levels in the atmosphere and the dryness at one of the pressure levels. There are three different methods of computing HI depending upon whether the area elevation is considered low, medium or high. Each NWS office determines the elevation which is most suitable for their area of responsibility. For each elevation, Haines Index classifications are assigned to values 2 through 6 as shown below...

Haines Index	Potential for Large Fire Growth
2 or 3	Very Low
4	Low
5	Moderate
6	High

The HI numbers are computed for each elevation using the following parameters...

HI	=	STABILITY TERM (A)	+	MOISTURE TERM (B)
Low Elevation HI	=	950-850 MB TEMP	+	850 MB TEMP-DEW POINT
		A=1 when 3°C or less		B=1 when 5°C or less
		A=2 when 4-7°C		B=2 when 6-9°C
		A=3 when 8°C or more		B=3 when 10°C or more
Mid Elevation HI	=	850-700 MB TEMP	+	850 MB TEMP - DEW POINT
		A=1 when 5°C or less		B=1 when 5°C or less
		A=2 when 6-10°C or less		B=2 when 6-12°C or less
		A=3 when 11°C or more		B=3 when 13°C or more
High Elevation HI	=	700-500 MB TEMP	+	700 MB TEMP - DEW POINT
		A=1 when 17°C or less		B=1 when 14°C or less
		A=2 when 18-21°C		B=2 when 15-20°C
		A=3 when 22°C or more		B=3 when 21°C or more

9. Inversion Burn-off

Information on inversion burn-off time and/or temperature is an optional forecast parameter that many user agencies may request. Since eroding inversions are often highly variable over a small area, forecast inversion burn-off times and temperatures will be most accurate and useful when used in site-specific weather forecasts. However, a qualitative analysis can be useful for synoptic discussions if forecaster confidence is high enough.

E. Specialized Services

Special services are meteorological services provided to customer agencies with unique requirements for fire weather support. These services are usually needed at a location outside the WFO and performed by either a fire weather program leader (FWPL) or an incident meteorologist (IMET). Special services include any on-site meteorological service such as weather observer training, weather station visits, and training requested by other user agencies.

Special services are usually initiated by the requesting agency, and costs such as travel, overtime, and per diem will be reimbursable to the NWS. Costs to be recovered from these agencies are calculated on the basis of expense reports submitted by the Forecast Office to NWS Southern Region Headquarters. Billing of the user agencies is handled by the appropriate NWS administrative division based on the expense report. Bills include a statement of services rendered, as well as the dates and locations of services provided.

The IMET Program

The NWS employs a small group of approximately 50 experienced and certified Incident Meteorologists (IMETs) that are dispatched to remote locations to support wildfire operations. Special training in microscale forecasting, fire behavior, and fire suppression operations makes these fire weather forecasters key members of fire incident management teams.

IMETs use special equipment in preparing critical forecasts used in wildfire suppression and prescribed burning projects. One of these tools is the All-hazard Meteorological Response System (AMRS) which enables forecasters to operate at the incident command post, providing close meteorological support to the suppression efforts. The AMRS can be used throughout the country wherever wildfire, chemical spills, and other catastrophes threatens life, property, or other valuable resources.

These IMETs can deploy rapidly with portable forecast and communications equipment to provide critical fire weather forecasting support. The forecaster sets up a portable unit near the fire lines and provides critical information that helps fire managers decide where to move fire crews, learn about incoming weather, plan tactics, and provide for fire fighter and public safety.

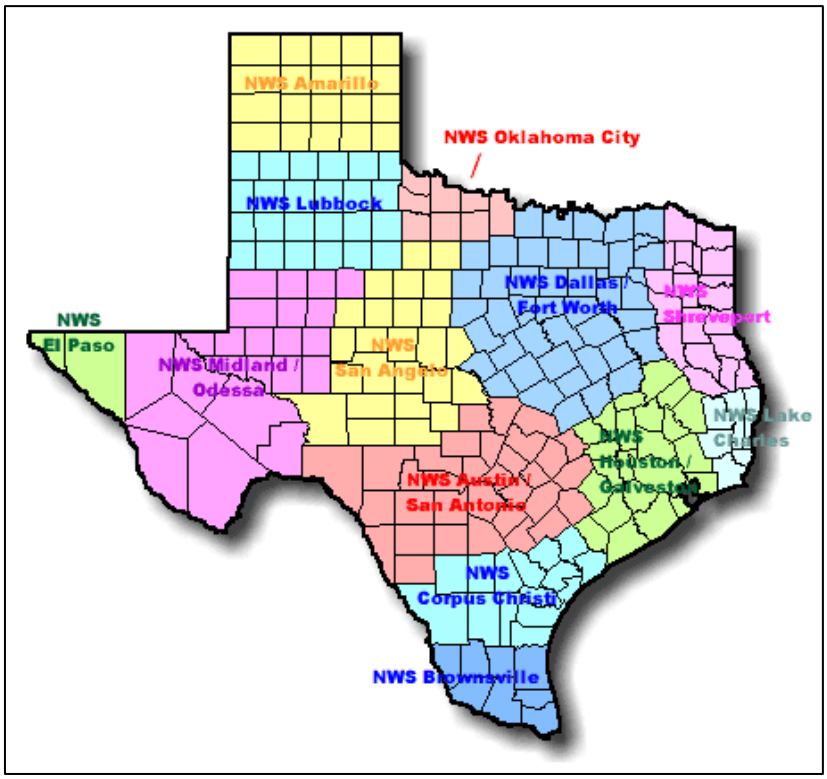
Requests for the on-site meteorological services should be made through Predictive Services, with the Southwest Area Coordination Center in Albuquerque, NM serving that part of Texas west of the 100 degrees longitude or the Southern Area Coordination Center in Atlanta, GA serving that part of Texas east of 100 degrees longitude. The fire weather program leader or Meteorologist-in-Charge at the appropriate NWS office should be made aware of the need for IMET services in their County Warning and Forecast Area (CWFA). Typically, the IMET nearest the incident will be deployed.

Not all NWS offices have a certified IMET. USDA Forest Service Regions should have a list of available IMETs. During times of limited resources, IMETs from other areas of the country may be called. For offices that do have an IMET, TICC has the authority to request special services to serve a part of that NWS office's area of responsibility as long as it lies within the jurisdiction of TICC's dispatch zone. TICC managers should then enter the availability of the requested IMET in the Resource Ordering and Status System (ROSS). IMETs that have been dispatched locally need to coordinate their unavailability with the National IMET Program Leader, Larry Van Bussum.

F. NWS Weather Forecast Offices

Each NWS Weather Forecast Office providing fire weather services to the state of Texas is staffed with meteorologists trained in fire weather forecasting 24 hours a day, 7 days a week, including holidays.

This section discusses the geographical service area of each NWS Office as well as the variety of services each office provides.



Due to the style of some products remaining constant from one office to the next, this section will focus only on the products and services unique to each office; details common to all offices are discussed in more detail in previous sections.

Examples of each product listed below are available from the active web link which may be bookmarked for later use.

Customer feedback on local policies
Questions or concerns regarding the policies outlined in this section should be directed to the fire weather program leader (FWPL) and/or the MIC of the respective NWS office(s) or contact...

Paul Witsaman, Fire Weather Program Manager
NWS Southern Region Headquarters
819 Taylor Street, Room 10E09
Fort worth, Texas 76102
Ph: 817.978.1100 x116

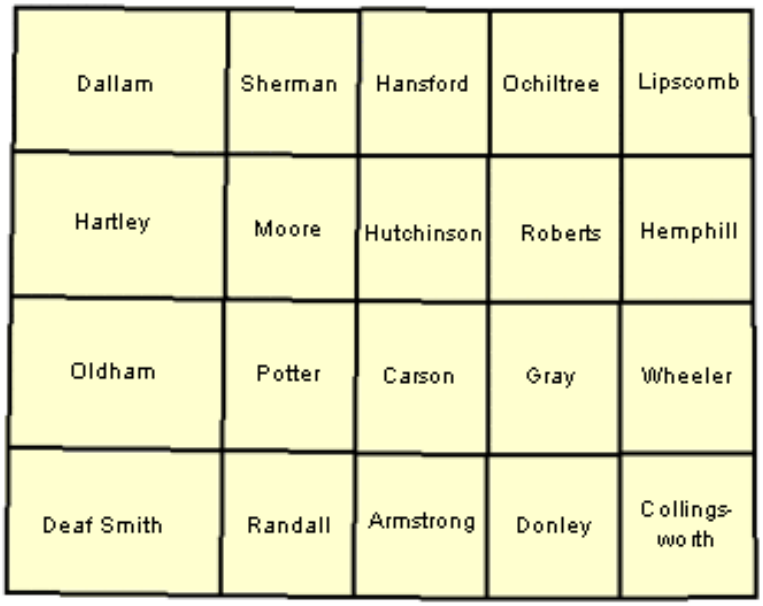
1. NWS Amarillo

Fire Weather Program Leader:
Ken Schneider

Meteorologist-In-Charge:
Jose Garcia

NWS Amarillo
1900 English Road
Amarillo, TX 79108

Phone: 806-335-1121



Forecast Area:
The Amarillo Weather Forecast Office located in Amarillo has a responsibility of providing fire weather information for the following counties in the Texas Panhandle:

Armstrong	Donley	Hutchinson	Potter
Carson	Gray	Lipscomb	Randall
Collingsworth	Hansford	Moore	Roberts
Dallam	Hartley	Ochiltree	Oldham
Deaf Smith	Hemphill	Sherman	Wheeler

Federal Land Management Agencies Served:
National Park Service (Alibates Flint Quarries National Monument and Lake Meredith National Recreation Area)
U.S. Fish and Wildlife Service (Buffalo Lake National Wildlife Refuge)
U.S. Forest Service (Black Kettle National Grassland, McClellan Creek National Grassland and Rita Blanca National Grassland)

Red Flag Criteria for the Texas panhandle:
RFW criteria for the Amarillo NWS office must conform to the following requirements from the Southwest Area Fire Weather Operating Plan...

-20 foot wind speeds of 20 mph or greater and/or gusts to 35 mph or higher
-Relative Humidity of 15 percent or less, and NFDRS adjective rating of HIGH or greater
-Will consider issuance based on dry lightning potential due to life and property concerns.

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier LBBFWFAMA; WMO Header FNUS54 KAMA):
These forecasts will be issued routinely twice a day at 7 am and 330 pm. In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect as required by NWSI 10-4, the AMA FWF offers additional parameters including chance of precipitation, precipitation type, LAL, maximum height of the mixing layer (feet AGL), mean transport wind speed (knots/hour) and direction in the mixing layer, and mid level HI. Winds are indicated as 20-foot.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier LBBRFWAMA; WMO Header WWUS84 KAMA):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

Fire Danger Statement (product identifier LBBRFDAMA; WMO Header FNUS64 KAMA):
This is an event driven product that elaborates on the weather conditions which support high fire behavior and is also issued when there are ongoing wildfires anywhere in the Oklahoma and Texas panhandles.

NFDRS Forecasts (product identifier LBBFWMAMA; WMO Header FNUS84 KAMA):
This product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
CEDAR	418701	Hutchinson
BOOTLEG	418801	Deaf Smith

2. NWS Austin/San Antonio

Fire Weather Program Leader:
Monte Oaks

Meteorologist-In-Charge:
Joe Arellano

NWS Austin/San Antonio
2090 Airport Road
New Braunfels, TX 78130

Phone: 830-606-3617

Forecast Area: The Austin/San Antonio Weather Forecast Office, located in New Braunfels, has a responsibility of providing fire weather information for the following counties in South Central Texas:

Atascosa	Dimmit	Kendall	Travis
Bandera	Edwards	Kerr	Uvalde
Bastrop	Fayette	Kinney	Val Verde
Bexar	Frio	Lavaca	Williamson
Blanco	Gillespie	Lee	Wilson
Burnet	Gonzales	Llano	Zavala
Caldwell	Guadalupe	Maverick	
Comal	Hays	Medina	
Dewitt	Karnes	Real	

Federal Land Management Agencies Served:
U.S. Fish and Wildlife Service (Balcones Canyonlands National Wildlife Refuge)
National Park Service (Amistad National Recreation Area and Lyndon B. Johnson and San Antonio Missions National Historical Parks)

The Austin/San Antonio NWS Office also serves as the state liaison office for Texas.

Red Flag Criteria for South Central Texas:

-20-ft wind speeds of 15 mph or greater; daytime minimum RH below 25%
-20-ft wind speeds of 15 mph or greater; nighttime maximum RH below 60%
-Presence of dry lightning (LAL=6)
-Expected dry wind shifts and/or extremely low humidity
-Presence of ongoing wildfires in South Central TX

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier SATFWFEWX; WMO Header FNUS54 KEWX):
These forecasts will be issued routinely twice a day at 7 am and 330 pm. In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect as required by the NDS, the EWX FWF offers additional parameters of temperature and RH trends for the first 24 hours, LAL, maximum height of the mixing layer (feet AGL), mean transport wind speed (miles/hour) and direction in the mixing layer, precipitation type, chance of wetting rain and low level HI. Winds are indicated as 20-foot.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier SATRFWEWX; WMO Header WWUS84 KEWX):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

NFDRS Forecasts (product identifier SATFWMEWX; WMO Header FNUS84 KEWX):
This product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
BASTROP	415501	Bastrop
LAGRANGE	415602	Fayette
BIRD	417901	Gillespie
BALCONES CANYONLANDS	417902	Travis
GAUDALUPE RIVER SP	418101	Comal
LAGO VISTA	419983	Atascosa

3. NWS Brownsville

Fire Weather Program Leader:
Kurt Vanspeybroeck

Meteorologist-In-Charge:
Andy Patrick

NWS Brownsville
20 South Vermillion
Brownsville, TX 78521-5798

Phone: 956-504-1432

Forecast Area: The Brownsville Weather Forecast Office located in Brownsville has a responsibility of providing fire weather information for the following counties in Deep South Texas:

Brooks	Hidalgo	Kenedy	Willacy
Cameron	Jim Hogg	Starr	Zapata

Federal Land Management Agencies Served:
National Park Service (Padre Island National Seashore and Palo Alto Battlefield National Historical Site)
U.S. Fish and Wildlife Service (Laguna Atascosa, Lower Rio Grande Valley, and Santa Ana National Wildlife Refuges)

Red Flag Criteria for Deep South Texas:
-Sustained 20 ft wind speeds of 20 mph or greater
-Sustained 20 ft wind speeds of 15 mph or greater if humidity is below criteria prior to a wind shift of 45 degrees or more
-Minimum daytime humidity less than 35%; maximum humidity recovery less than 70%.

Fire Weather Products Issued:
Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier SATFWFBRO; WMO Header FNUS54 KBRO):
These forecasts will be issued routinely once a day at around 7 am. In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect as required by NWSI 10-4, the BRO FWF offers temperature and RH trends for the first 24 hours, precipitation type, forecast precipitation amounts, maximum height of the mixing layer (feet MSL/AGL-mixed), mean transport wind speed (miles/hour) and direction in the mixing layer, and Keetch-Byram Index. Low level winds are forecast at 20-foot.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier SATRFWBRO; WMO Header WWUS84 KBRO):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

NFDRS Forecasts (product identifier SATFWMBRO; WMO Header FNUS84 KBRO):
This product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
SANTA ANA NWR	418602	Hidalgo
LAGUNA ATASCOSA	418603	Cameron
FALCON LAKE	418604	Starr
LINN-SAN MANUAL	418605	Hidalgo

4. NWS Corpus Christi

Fire Weather Program Leader:
Jason Runyen

Meteorologist-In-Charge:
VACANT

NWS Corpus Christi
300 Pinson Drive
Corpus Christi, TX 78406-1803

Phone: 361-289-0959

Forecast Area: The Corpus Christi Weather Forecast Office located in Corpus Christi has a responsibility of providing fire weather information for the following counties in the Coastal Bend and Rio Grande Plains of South Texas:

Aransas	Goliad	Live Oak	San Patricio
Bee	Jim Wells	McMullen	Victoria
Calhoun	Kleberg	Nueces	Webb
Duval	La Salle	Refugio	

Federal Land Management Agencies Served:
National Park Service (Padre Island National Seashore)
U.S. Fish and Wildlife Service (Aransas National Wildlife Refuge)

Red Flag Criteria for the Coastal Bend:
20-Foot winds at or above 25 mph AND

Coastal Counties	Inland Counties
Relative Humidities at or below 40%	Relative Humidities at or below 30%
These combinations of low RH and strong winds have been determined to be critical to wildfire potential and growth across South Texas.	

Also, a Red Flag Warning may also be issued if one of the following conditions occurs...

-Any weather change that would increase fire danger, start new fires or present control problems to ongoing fires.

Note: Since most of the fuels to carry fires in South Texas are 1-hour fuels (grasses), then antecedent moisture is not as important.

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, NFDRS Forecasts, and Spot Forecasts

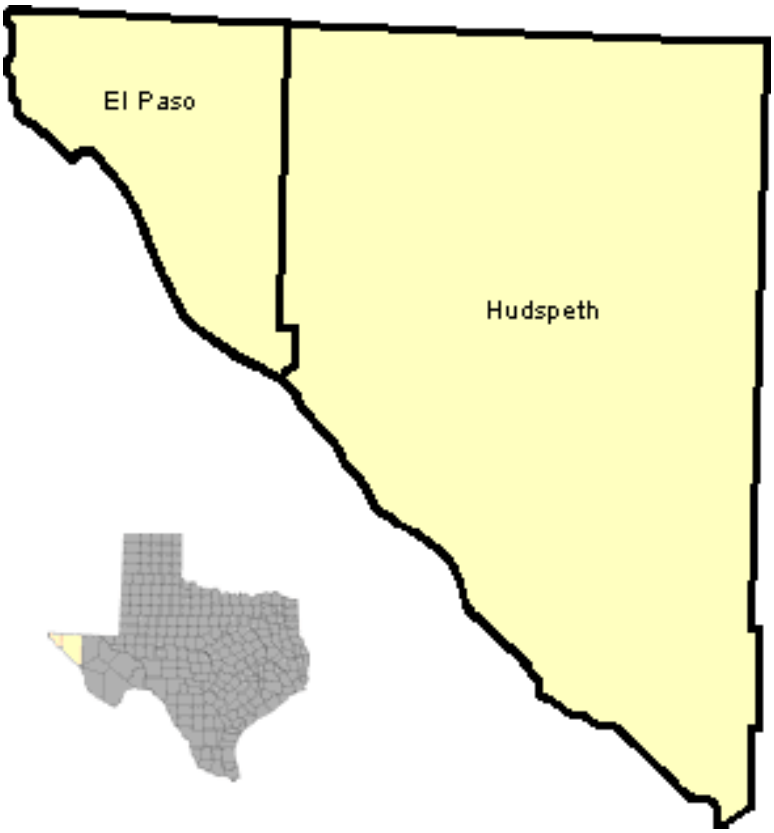
Fire Weather Planning Forecast (product identifier SATFWFCRP; WMO Header FNUS54 KCRP):
These forecasts will be issued routinely once a day at around 8 am. In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect as required by NWSI 10-4, the routine fire weather forecast offers forecast precipitation type and amounts, expected duration of precipitation (hours), maximum height of the mixing layer (feet AGL), and mean transport wind speed (knots/hour) and direction in the mixing layer. Low level winds are forecast at 20-foot.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier SATRFWCRP; WMO Header WWUS84 KCRP):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

NFDRS Forecasts (product identifier SATFWMCRP; WMO Header FNUS84 KCRP):
This product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
GEORGE WEST	418201	Live Oak
VICTORIA	418202	Victoria
ARANSAS NWR	418502	Aransas

5. NWS El Paso



Fire Weather Program Leader:
Tom Bird

Meteorologist-In-Charge:
Bill Alexander

NWS El Paso
7950 Airport Road Santa Teresa, NM 88008

Phone: 505-589-4088

Forecast Area: The El Paso Weather Forecast Office located in Santa Teresa, NM has a responsibility of providing fire weather information for the following counties in Far West Texas:

El Paso	Hudspeth		

Federal Land Management Agencies Served:
National Park Service (Chamizal National Memorial Park)
The El Paso NWS Office also provides IMET services for the State of Texas

Red Flag Criteria for Far West Texas:
RFW criteria for the El Paso NWS office must conform to the following requirements from the Southwest Area Fire Weather Operating Plan...

-20 foot wind speeds of 20 mph or greater
-Relative Humidity of 15 percent or less, and NFDRS adjective rating of HIGH or greater

Note: The Gila and Lincoln Zone Dispatch Centers will be notified of RFW Issuances.

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier LBBFWFEPZ; WMO Header FNUS54 KEPZ):

In season (approximately May 1st - Oct 31st)	Off Season (approximately Nov. 1st - Mar 31st)
These forecasts will be issued routinely twice a day-first issued around 930 am and again at around 230 pm. In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect as required by NWSI 10-4, the routine fire weather forecast offers forecast chance of rain, relative humidity, LAL, high-level HI, and 10000 foot winds (knots).	The FWF is issued once daily around 930 am. The off-season format discontinues LAL and HI. Maximum height of the mixing layer (feet AGL), and mixing layer transport winds are added to aide in smoke dispersal decisions.

Low level winds are forecast as 20-foot.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier LBBRFWEPZ; WMO Header WWUS84 KEPZ):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

NFDRS Forecasts:
Currently there are no NFDRS sites in the Texas portion of the ELP CWFA.

6. NWS Fort Worth/Dallas

Fire Weather Program Leader:
Joe Harris

Meteorologist-In-Charge:
Bill Bunting

NWS Fort Worth/Dallas
3401 Northern Cross Blvd.
Fort Worth, Texas 76137-3610

Phone: 817-429-2631

The Fort Worth/Dallas Weather Forecast Office located in Fort Worth has a responsibility of providing fire weather information for the following counties in North Texas:

Anderson	Erath	Johnson	Parker
Bell	Falls	Kaufman	Rains
Bosque	Fannin	Lamar	Robertson
Collin	Freestone	Lampasas	Rockwall
Comanche	Grayson	Leon	Stephens
Cooke	Hamilton	Limestone	Somervell
Coryell	Henderson	McLennan	Tarrant
Dallas	Hill	Milam	Van Zandt
Delta	Hood	Mills	Wise
Denton	Hopkins	Montague	Young
Eastland	Hunt	Navarro	
Ellis	Jack	Palo Pinto	

Federal Land Management Agencies Served:
U.S. Fish and Wildlife Service (Hagerman National Wildlife Refuge)
U.S. Forest Service (Caddo and Lyndon B. Johnson National Grasslands)

Red Flag Criteria for North Central Texas:

-Wind advisory winds of 20-30 mph,
-Minimum humidity levels of 30% or less,
-Dry thunderstorms, and
-Ongoing large wildfires.

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, North Texas Grass Fire Danger Statements, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier FTWFWFFTW; WMO Header FNUS54 KFWD):
Fire weather forecasts from the Fort Worth/Dallas NWS office are issued twice a day-the first issuance in the morning between 7 and 8 am and the latter an update between 3 and 4 pm. In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect as required by NWSI 10-4, the routine fire weather forecast offers additional parameters including chance and type of precipitation, height of the mixing layer (both meters and feet AGL/MSL--blended), mean transport wind speed (meters/second) and direction in the mixing layer, and expected hours of sunshine. Low level winds are forecast as 20-foot.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier FTWRFWFWD; WMO Header WWUS84 KFWD):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

North Texas Grass Fire Danger Statement (CHECK DATE) (product identifier FTWRFDFWD; WMO Header FNUS64 KFWD):
Fire Danger Statements are issued on an as needed basis, when there is either a very high or extreme fire danger. These conditions are determined and are based on stage of vegetation, expected afternoon high temperature, afternoon minimum relative humidity and daytime wind speed. Also included in the product are any burn bans that may be currently in effect.

NFDRS Forecasts (product identifier FTWFWMFWD; WMO Header FNUS84 KFWD):
This product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
CADDO	410202	Fannin
ATHENS	412101	Henderson
PALESTINE	412601	Anderson
POSSUM KINGDOM SP	419402	Palo Pinto
LBJ	419601	Wise
GREENVILLE	419602	Hunt
CEDAR HILL SP	419701	Dallas
GRANBURY	419702	Hood
TEMPLE	419801	Bell
MCGREGOR	419802	McLennan

7. NWS Houston/Galveston

Fire Weather Program Leader:
Kent Prochazka

Meteorologist-In-Charge:
Bill Read

NWS Houston/Galveston
1620 Gill Road
Dickinson, TX 77539

Phone: 281-337-5074

The Houston/Galveston Weather Forecast Office located in Dickinson has a responsibility of providing fire weather information for the following counties in Southeast Texas:

Austin	Fort Bend	Liberty	Trinity
Brazoria	Galveston	Madison	Walker
Brazos	Grimes	Matagorda	Waller
Burleson	Harris	Montgomery	Washington
Chambers	Houston	Polk	Wharton
Colorado	Jackson	San Jacinto	

Federal Land Management Agencies Served:
National Park Service (Big Thicket National Preserve)
U.S. Fish and Wildlife Service (Anahuac National Wildlife Refuge, Attwater Prairie Chicken National Wildlife Refuge and Big Boggy/Brazoria/San Bernard National Wildlife Refuges)
U.S. Forest Service (Davy Crockett and Sam Houston National Forests)

Red Flag Criteria for Southeast Texas:
When low humidity (20-25 percent or less) is expected to combine with high winds (15 to 25 mph sustained or higher), and fuel moistures are low.

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier SATFWFHGX; WMO Header FNUS54 KHGX):
Fire weather forecasts from the Houston/Galveston NWS office are issued twice a day-the first issuance in the morning at around 730 am and the latter an update at around 330 pm. In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect as required by NWSI 10-4, the routine fire weather forecast offers additional parameters, including hours of sunshine, ventilation rate (meters squared/second), fog potential, category day, height of the mixing layer (both feet and meters AGL), and mean transport wind speed (both knots and meters/second) and direction in the mixing layer. Low level winds are forecast at 20-foot.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier SATRFWHGX; WMO Header WWUS84 KHGX):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

NFDRS Forecasts (product identifier SATFWMHGX; WMO Header FNUS84 KHGX): This product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
RATCLIFF (NECHES/RATCLIFF in ASCADS)	413302	Houston
HUNTSVILLE	414102	Walker
COLDSPRINGS	414201	San Jacinto
CONROE	415109	Montgomery
DAYTON	415201	Liberty
ANAHUAC PORTABLE	416099	Chambers
ATWATERS	416601	Colorado
BRAZORIA	418301	Brazoria
SAN BERNARD	418302	Brazoria

8. NWS Lake Charles

Fire Weather Program Leader:
Kent G. Kuyper

Meteorologist-In-Charge:
Steve Rinard

NWS Lake Charles
500 Airport Blvd., #115
Lake Charles, LA 70607-0668

Phone: 337-477-5285

The Lake Charles Weather Forecast Office located in Lake Charles, LA has a responsibility of providing fire weather information for the following counties in Extreme Southeast Texas:

Hardin	Jefferson	Orange	Tyler
Jasper	Newton		

Federal Land Management Agencies Served:
National Park Service (Big Thicket National Preserve)
U.S. Fish and Wildlife Service (McFaddin and Texas Point National Wildlife Refuges)

Red Flag Criteria for Extreme Southeast Texas:
In general, Fire Weather Watches and Red Flag Warnings will be issued when sustained winds of 20 to 25 mph or greater are expected while the region is at Preparedness Level 2 or greater. Preparedness Level 2 or higher in the Gulf Coast Area means that fuels are sufficiently dry and RH values are usually low enough (>30 to 35%) or strong winds to cause erratic and extreme fire behavior.

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier NEWFWFLCH; WMO Header FNUS54 KLCH):
Fire weather forecasts from the Lake Charles NWS office are issued twice a day--the first issuance in the morning at around 6 am and the latter an update at around 3 pm. In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect as required by NWSI 10-4, the routine fire weather forecast offers additional parameters, including precipitation type and amount, precipitation timing and duration, LAL, maximum and minimum mixing heights (feet AGL/MSL--blended), ceiling heights, mean transport wind speed (miles/hour) and direction in the mixing layer, dispersion index, ventilation rate (knot-feet), category day, and Keetch-Byram Index. Low level winds are forecast at 20-foot.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier NEWRFWLCH; WMO Header WWUS84 KLCH):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

NFDRS Forecasts (product identifier NEWFWMLCH; WMO Header FNUS84 KLCH):
This product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
WOODVILLE	414402	Tyler
KIRBYVILLE	414501	Jasper
SOUTHERN ROUGH	416101	Tyler
MCFADDIN	419901	Jefferson

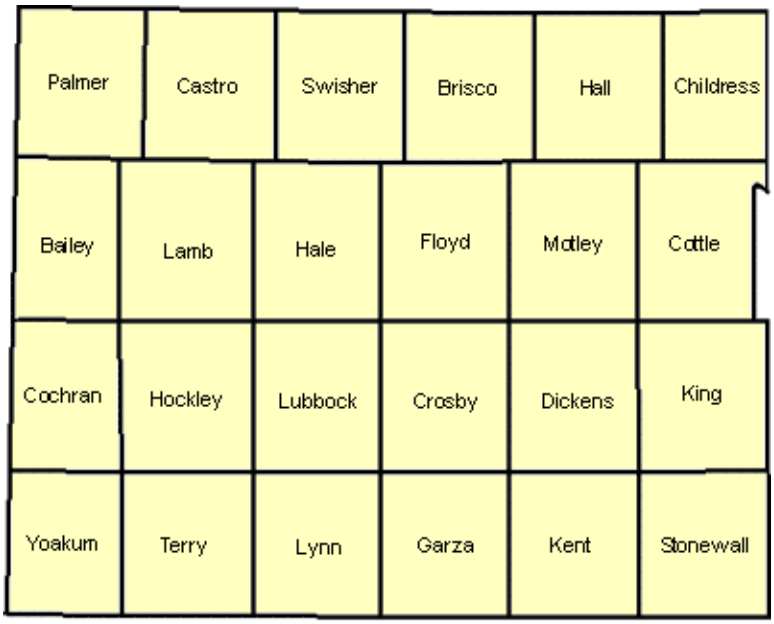
9. NWS Lubbock

Fire Weather Program Leader:
Jose Valdez

Meteorologist-In-Charge:
Justin Weaver

NWS Lubbock
2579 South Loop 289, Suite 100
Lubbock, TX 79423-1400

Phone: 806-745-4260



The Lubbock Weather Forecast Office located in Lubbock has a responsibility of providing fire weather information for the following counties in the South Plains of Northwest Texas:

Bailey	Crosby	Hockley	Motley
Brisco	Dickens	Kent	Parmer
Castro	Floyd	King	Stonewall
Childress	Garza	Lamb	Swisher
Cochran	Hale	Lubbock	Terry
Cottle	Hall	Lynn	Yoakum

Federal Land Management Agency Served:
U.S. Fish and Wildlife Service (Muleshoe National Wildlife Refuge)

Red Flag Criteria for the South Plains of Northwest Texas:
RFW criteria for the Lubbock NWS office must conform to the following requirements from the Southwest Area Fire Weather Operating Plan:

-20 foot wind speeds of 20 mph or greater
-Relative Humidity of 15 percent or less
-NFDRS rating of HIGH or greater

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier LBBFWFLUB; WMO Header FNUS54 KLUB):
These forecasts will be issued routinely once a day at around 7 am. Format is tabular. In addition to mandatory forecast parameters and information of RFW information as required by NWSI 10-4, additional parameters include chance and type of precipitation, max/min temperature and RH trends through 24 hours, maximum height of the mixing layer (feet AGL/MSL—mixed), transport winds (knots) and Haines Index. Low level winds are forecast as 20-foot.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier LBBRFWLUB; WMO Header WWUS84 KLUB):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

NFDRS Forecasts (product identifier LBBFWMLUB; WMO Header FNUS84 KLUB):
This product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
CAPPROCK	418901	Briscoe
MATADOR WMA	418902	Motley

10. NWS Midland/Odessa

Fire Weather Program Leader:
Gregory Murdoch

Meteorologist-In-Charge:
Raymond Fagen

NWS Midland/Odessa
2500 Challenger Drive
Midland, TX 79703

Phone: 432-563-5006

The Midland/Odessa Weather Forecast Office located in Midland has a responsibility of providing fire weather information for the following counties in West Texas:

Andrews	Ector	Martin	Reeves
Borden	Gaines	Midland	Scurry
Brewster	Glasscock	Mitchell	Terrell
Crane	Howard	Pecos	Upton
Culberson	Jeff Davis	Presidio	Ward
Dawson	Loving	Reagan	Winkler

Federal Land Management Agency Served:
National Park Service (Big Bend National Park, Fort Davis National Historic Site and Guadalupe Mountains National Park)
The Midland NWS Office also provides IMET services for the State of Texas

Red Flag Criteria for the Trans-Pecos Region:
RFW criteria for the Midland/Odessa NWS office must conform to the following requirements from the Southwest Area Fire Weather Operating Plan...

-20 foot wind speeds of 20 mph or greater and/or gusts to 35 mph or higher,
-Relative Humidity of 15 percent or less, and
-NFDRS adjective rating of HIGH or greater

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier LBBFWFMAF; WMO Header FNUS54 KMAF):
NWS Midland/Odessa issues routine fire weather forecast for the mountains of Southwest Texas. These forecasts are issued twice daily generally no later than 1030 am and 330 pm local during the "fire weather season". The "fire weather season" for the Midland/Odessa NWS office is considered between March 1 and November 1. In the "off season" the FWF is issued once a day no later than 1030 am local.

In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect as required by NWSI 10-4, the routine fire weather forecast offers additional parameters, including percent chance of a wetting rain, 10,000 foot free air winds, lightning activity level, Haines Indices (using a mix of mid and high levels depending on the time of year), and ventilation data are also included.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier LBBRFWMAF; WMO Header WWUS84 KMAF):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

NFDRS Forecasts (product identifier LBBFWMMAF; WMO Header FNUS84 KMAF):
NWS Midland/Odessa is responsible for NFDRS zone 350 in southeast New Mexico and the Texas portion of zone 364, which includes the Guadalupe Mountains NP. In order for the forecaster to issue a forecast, an observation must be received. Individual station trends forecast are issued in zone 364 so there is no conflict with the zone trend forecast for 364 issued by El Paso and zone trends are provided for zone 350. Site forecasts are also provided for the Chisos Basin and Panther Junction sites in the Big Bend NP and also the Fort Davis and Midland RAWS sites. Additional information on NFDRS forecasts will be provided in the LAOP for the Midland/Odessa office.

This FWM product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
PINERY	417101	Culberson
THE BOWL	417103	Culberson
FORT DAVIS	417201	Jeff Davis
DAVIS	417201	Jeff Davis
PANTHER JUNCTION	417401	Brewster
CHISOS	417403	Brewster
MIDLAND	419202	Midland

11. NWS Oklahoma City

Fire Weather Program Leader:
Thomas Curl

Meteorologist-In-Charge:
Mike Foster

NWS Oklahoma City
1200 Westheimer Drive,
Room 101
Norman, OK 73069

Phone: 405-360-5928

The Oklahoma City/Norman Weather Forecast Office located in Norman, OK has a responsibility of providing fire weather information for the following counties in North Texas:

Archer	Clay	Hardeman	Wichita
Baylor	Foard	Knox	Wilbarger

Federal Land Management Agency Served:
None

Red Flag Criteria:
Red flag criteria for the Norman Oklahoma WFO portion of Northwest Texas is for RH less than or equal to 20 percent combined with 20 mph or higher 20-foot winds.

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, Fire Danger Statements, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier OKCFWFOKC; WMO Header FNUS54 KOUN):
Routinely issued twice per day by 4:45 am and by 4:15 pm. Parameters, other than those that are mandatory and the information on RFW status as required by NWSI 10-4, includes the following:

-Cloud cover,
-Max/min temperature,
-Max/min humidity,
-20-foot AM/PM wind (mph),
-Precipitation type and chances,
-Mixing height (meters AGL),
-Transport winds (meters/second), and
-Ventilation rate (meters squared/second).

It also includes the extended forecast for days 3 thru 7.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier OKCRFWOUN; WMO Header WWUS84 KOUN):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

Fire Danger Statement (CHECK DATE) (product identifier OKCFWMOKC; WMO Header FXUS76 KOUN):
Fire Danger Statements are issued on an as needed basis, when there is either a very high or extreme fire danger. These conditions are determined and are based on stage of vegetation, expected afternoon high temperature, afternoon minimum relative humidity and daytime wind speed. Also included in the product are any burning bans that may be currently in effect.

NFDRS Forecasts (product identifier OKCFWMOUN; WMO Header FNUS84 KOUN):
This product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
MILLER CREEK	419301	Baylor

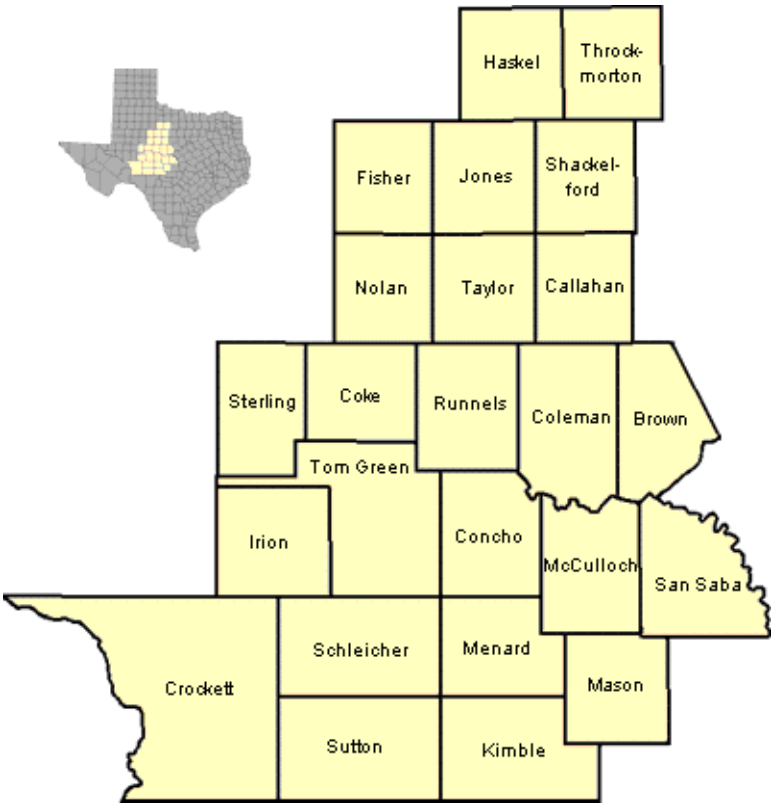
12. NWS San Angelo

Fire Weather Program Leader:
Mark Cunningham

Meteorologist-In-Charge:
Buddy Mcintyre

NWS San Angelo
7654 Knickerbocker Road
San Angelo, TX 76904-7892

Phone: 325-944-9445



The San Angelo Weather Forecast Office located in San Angelo has a responsibility of providing fire weather information for the following counties in West Central Texas:

Brown	Fisher	McCulloch	Shackelford
Callahan	Haskell	Menard	Sterling
Coke	Irion	Nolan	Sutton
Coleman	Jones	Runnels	Taylor
Concho	Kimble	San Saba	Throckmorton
Crockett	Mason	Schleicher	Tom Green

Federal Land Management Agency Served:
United States Department of Agriculture (Natural Resources Conservation Service)

Red Flag Criteria for West Central Texas:
Red Flag Warnings are issued when minimum afternoon relative humidity is forecast to fall below 20 percent and sustained 20 foot winds equal or exceed 18 mph (25 mph at the 33 foot ASOS anemometer level). Sufficient dead fuel availability is also a requirement.

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier LBBFWFSJT; WMO Header FNUS54 KSJT):
Routinely issued every day of the year. Issuance times: 5 AM Central Time; updated 2 PM Central Time. Format: Tabular with Synopsis and narrative Extended Forecast. Forecast parameters: Cloud Amount, Probability of Precipitation, Precipitation Type, Max/Min Temperature, Wind Direction, 20 Foot Wind Speed, Max/Min Relative Humidity, Mixing Height, Transport Direction, Transport Speed.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier LBBRFWSJT; WMO Header WWUS84 KSJT):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

NFDRS Forecasts (product identifier LBBFWMSJT; WMO Header FNUS84 KSJT):
This product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
BARNHART	417701	Crockett
MASON	417801	Mason
BARNHART (historical)	419201	Irion
HAMBY	419401	Taylor
COLORADO BEND SP	419501	San Saba
COLEMAN	419502	Coleman

13. NWS Shreveport

Fire Weather Program Leader:
Bill Adams

Meteorologist-In-Charge:
Armando Garza

NWS Shreveport
5655 Hollywood Ave.
Shreveport, LA 71109-7750

Phone: 318-631-3669

The Shreveport Weather Forecast Office located in Shreveport, LA has a responsibility of providing fire weather information for the following counties in East Texas:

Angelina	Gregg	Red River	Titus
Bowie	Harrison	Rusk	Upshur
Camp	Marion	Sabine	Wood
Cass	Morris	San Augustine	
Cherokee	Nacogdoches	Shelby	
Franklin	Panola	Smith	

Federal Land Management Agency Served:
U.S. Forest Service (Angelina and Sabine National Forests)

Red Flag Criteria:
Weather conditions which warrant issuance of these products are strong wind with low relative humidity (generally 25 mph or higher with less than 25 percent relative humidity), lightning risk, and fire danger in the high or extreme categories.

Fire Weather Products Issued: Fire Weather Planning Forecasts, Red Flag Warnings, Fire Weather Watches, NFDRS Forecasts, and Spot Forecasts

Fire Weather Planning Forecast (product identifier NEWFWFSHV; WMO Header FNUS54 KSHV):
Fire weather forecasts from the Shreveport NWS office are issued twice a day; the first issuance in the morning at around 7:00 am and the latter an update at around 3:00 pm. In addition to the required forecast parameters and information on any fire weather watches and red flag warnings in effect, the routine fire weather forecast offers additional parameters, including precipitation amount, precipitation duration, 500 m/1700 ft mixing height temperatures, maximum and minimum mixing heights (meters and feet MSL), mean transport wind speed (meters/second and miles/hour) and direction in the mixing layer, ventilation index, and category day. Low level winds are forecast as 20-foot.

Fire Weather Watch/Red Flag Warning (CHECK DATE) (product identifier NEWRFWSHV; WMO Header WWUS84 KSHV):
This is an event driven product elaborating on the weather conditions that support extreme fire behavior. The information provided in this product should also be found in the routine fire weather forecast.

NFDRS Forecasts (product identifier NEWFWMSHV; WMO Header FNUS84 KSHV):
This product is issued each afternoon after NWS forecasters receive the FWO collective that includes the following stations:

COMMON NAME	GOES ID	TX COUNTY
CLARKSVILLE	410401	Red River
TEXARKANA	410501	Bowie
LINDEN	411102	Cass
GILMER	411401	Upshur
CADDO LAKE	411901	Harrison
HENDERSON	412202	Rusk
SABINE NORTH	412901	Shelby
ZAVALLA	413503	Angelina
LUFKIN	413509	Angelina
SABINE SOUTH	413701	Sabine

III. APPENDICES

Appendix 1: RFW Criteria for Texas NWS Offices

RH and Wind Criteria Summary Disclaimer: This summary was created to provide a general comparison of WFO criteria for planning purposes. For specific criteria, please use *Section II.F*

OFFICE	RH CRITERIA (PERCENT AT OR BELOW MINIMUMS UNLESS OTHERWISE NOTED)	WIND CRITERIA (AT OR ABOVE 20 FT WINDS IN MPH UNLESS OTHERWISE NOTED)
AMARILLO	15	20
AUSTIN/SAN ANTONIO	25 MIN 60 MAX	15
BROWNSVILLE	35 MIN 70 MAX	15 (WITH RH CRITERIA) 20 (WITHOUT RH CRITERIA)
CORPUS CHRISTI	30 INLAND 40 COASTAL	25
EL PASO	15	20
FORT WORTH/DALLAS	30	25 (33 FOOT LEVEL: ACTUAL VALUES BASED ON 20-30 MPH WIND ADVISORY CRITERIA)
HOUSTON/GALVESTON	20 (WITH MODERATE FUEL MOISTURE) 25 (WITH LOW MOISTURE)	25 (WITH MODERATE FUEL MOISTURE) 15 (WITH LOW FUEL MOISTURE)
LAKE CHARLES, LA	30 (WITH MODERATE FUEL MOISTURE) 35 (WITH LOW FUEL MOISTURE)	25 (WITH MODERATE FUEL MOISTURE) 20 (WITH LOW FUEL MOISTURE)
LUBBOCK	15	20
MIDLAND/ODESSA	15	20
NORMAN, OK	20	20
SAN ANGELO	20	18
SHREVEPORT, LA	25	25

Appendix 2: NFDRS Stations

COMMON NAME	GOES ID	NWS OFFICE	NWS ID	TX COUNTY
CEDAR	418701	Amarillo	AMA	Hutchinson
BOOTLEG	418801	Amarillo	AMA	Deaf Smith
SANTA ANA NWR	418602	Brownsville	BRO	Hidalgo
LAGUNA ATASCOSA	418603	Brownsville	BRO	Cameron
FALCON LAKE	418604	Brownsville	BRO	Starr
LINN-SAN MANUAL	418605	Brownsville	BRO	Hidalgo
GEORGE WEST	418201	Corpus Christi	CRP	Live Oak
VICTORIA	418202	Corpus Christi	CRP	Victoria
PADRE	418501	Corpus Christi	CRP	Kleberg
ARANSAS NWR	418502	Corpus Christi	CRP	Aransas
CADDO	410202	Ft. Worth	FWD	Fannin
ATHENS	412101	Ft. Worth	FWD	Henderson
PALESTINE	412601	Ft. Worth	FWD	Anderson
POSSUM KINGDOM SP	419402	Ft. Worth	FWD	Palo Pinto
LBJ	419601	Ft. Worth	FWD	Wise
GREENVILLE	419602	Ft. Worth	FWD	Hunt
CEDAR HILL SP	419701	Ft. Worth	FWD	Dallas
GRANBURY	419702	Ft. Worth	FWD	Hood
TEMPLE	419801	Ft. Worth	FWD	Bell
MCGREGOR	419802	Ft. Worth	FWD	McLennan
RATCLIFF (NECHES/RATCLIFF in ASCADS)	413302	Houston	HGX	Houston
HUNTSVILLE	414102	Houston	HGX	Walker
COLDSPRINGS	414201	Houston	HGX	San Jacinto
CONROE	415109	Houston	HGX	Montgomery
DAYTON	415201	Houston	HGX	Liberty
ANAHUAC PORTABLE	416099	Houston	HGX	Chambers
ATWATERS	416601	Houston	HGX	Colorado
BRAZORIA	418301	Houston	HGX	Brazoria
SAN BERNARD	418302	Houston	HGX	Brazoria
WOODVILLE	414402	Lake Charles	LCH	Tyler
KIRBYVILLE	414501	Lake Charles	LCH	Jasper
SOUTHERN ROUGH	416101	Lake Charles	LCH	Tyler
MCFADDIN	419901	Lake Charles	LCH	Jefferson
CAPPROCK	418901	Lubbock	LUB	Briscoe
MATADOR WMA	418902	Lubbock	LUB	Motley
PINERY	417101	Midland	MAF	Culberson
DOG CANYON	417102	Midland	MAF	Culberson
THE BOWL	417103	Midland	MAF	Culberson
MCKITTRICK CANYON	417104	Midland	MAF	Culberson

PX WELL	417105	Midland	MAF	Culberson
FORT DAVIS	417201	Midland	MAF	Jeff Davis
DAVIS	417201	Midland	MAF	Jeff Davis
PANTHER JUNCTION	417401	Midland	MAF	Brewster
CHISOS	417403	Midland	MAF	Brewster
MIDLAND	419202	Midland	MAF	Midland
BASTROP	415501	New Braunfels	EWX	Bastrop
LAGRANGE	415602	New Braunfels	EWX	Fayette
BIRD	417901	New Braunfels	EWX	Gillespie
BALCONES CANYONLANDS	417902	New Braunfels	EWX	Travis
GAUDALUPE RIVER SP	418101	New Braunfels	EWX	Comal
LAGO VISTA	419983	New Braunfels	EWX	Atascosa
MILLER CREEK	419301	Norman	OUN	Baylor
BARNHART	417701	San Angelo	SJT	Crockett
MASON	417801	San Angelo	SJT	Mason
BARNHART (historical)	419201	San Angelo	SJT	Irion
HAMBY	419401	San Angelo	SJT	Taylor
COLORADO BEND SP	419501	San Angelo	SJT	San Saba
COLEMAN	419502	San Angelo	SJT	Coleman
CLARKSVILLE	410401	Shreveport	SHV	Red River
TEXARKANA	410501	Shreveport	SHV	Bowie
LINDEN	411102	Shreveport	SHV	Cass
GILMER	411401	Shreveport	SHV	Upshur
CADDO LAKE	411901	Shreveport	SHV	Harrison
HENDERSON	412202	Shreveport	SHV	Rusk
SABINE NORTH	412901	Shreveport	SHV	Shelby
ZAVALLA	413503	Shreveport	SHV	Angelina
LUFKIN	413509	Shreveport	SHV	Angelina

Appendix 3: List of Abbreviations and Acronyms

AOP – Annual Operating Plan
AMRS – All-hazard Meteorological Response System
ASOS – Automated Surface Observation System
ATMU – Advanced Technology Meteorological Unit
AWIPS – Advanced Weather Information Processing System
BLM - Bureau of Land Management
COB – Close of Business
CWFA – Country Warning and Forecast Area
FBPS – Fire Behavior Prediction System
FWF – Fire Weather Planning Forecast
FWPL – Fire Weather Program Leader
FWS – Fish and Wildlife Service
GACC – Geographic Area Coordination Center
HAZMAT – Hazardous Materials
IMET – Incident Meteorologist
LDT – Local Daylight Time
LST – Local Standard Time
NDS – NWS Directives System
NFDRS – National Fire Danger Ratings System
NIFC – National Interagency Coordination Center
NPS – National Park Service
NWCG – National Wildland Coordinating Group
NWS – National Weather Service
NWSI – National Weather Service Instruction
RAWS – Remote Automated Weather System
RFW – Red Flag Warning.
SACC – Southern Area Coordination Center
SWACC – Southwest Area Coordination Center
TG – Telecommunications Gateway
TICC – Texas Interagency Coordination Center
USDA FS – United States Department of Agriculture Forest Service
WIMS – Weather Information Management System

Appendix 4: Glossary

Air Transportable Modular Unit (ATMU)
A weather data collection and forecasting facility used by an IMET.

Automated Surface Observing System (ASOS)
The computer system which produces most of the National Weather Service surface observations.

Advance Weather Interactive Processing System (AWIPS)
The main computer system that the National Weather Service uses to compose and transmit its forecasts and warning.

Burning index
An estimate of the potential difficulty of fire containment as it relates to the flame length at the head of the fire.

Burn-off temperature at 500 meters
The forecast temperature at the time in which the mixing height is expected to reach 500 meters.

County Warning and Forecast Area (CWFA)
The area in which a NWS office is responsible for issuing forecasts and warnings.

Dispersion
The decrease in concentration of airborne pollutants as they spread throughout an increasing volume of atmosphere.

Drainage wind
Normal nighttime airflow directed downslope or downvalley, caused by cooling of the air near the earth's surface. Air sinking toward lower elevations is usually quite gentle (light) in nature.

Dry lightning
A thunderstorm in which little if any precipitation occurs at the ground.

Effective windspeed
The midflame windspeed adjusted for the effect of slope on fire spread.

Extreme fire behavior
Fire behavior characterized by one or more of the following...high rate of spread...prolific crowning and/or spotting...presence of fire whirls...strong convection column.

Eye-level (six-foot) wind
Wind measured at eye level by a hand-held wind meter. These winds are affected by vegetation and terrain and are often used as mid-flame wind.

Fine (light) fuels
Fast-drying dead fuels, generally characterized by a high surface area-to-volume ratio. They have diameters ¼ inch or less. These fuels (grass, leaves, needles, etc.) Ignite readily and are consumed rapidly by fire when dry.

Fire behavior
The manner in which a fire reacts to the influences of fuel, weather and topography.

Fire behavior forecast
A prediction of probable fire behavior, usually prepared by a fire behavior analyst in support of fire suppression or prescribed burning operations.

Fire Behavior Prediction System (FBPS)
A system that uses a set of mathematical equations to predict certain aspects of fire behavior in wildland fuels when provided with data on fuel and environmental conditions.

Fire behavior analyst
Person responsible to the planning section chief for establishing a weather data collection system and for developing fire behavior predictions based on fire history, fuel, weather and topography.

Fire danger
A general term used to express an assessment of fixed and variable factors such as fire risk, fuels, weather and topography which influence whether fires will start, spread and do damage; also the degree of control difficulty to be expected.

Fire danger rating
A fire management system that integrates the effects of selected fire danger factors into one or more qualitative or numerical indices of current protection needs.

Fire season
Period(s) of the year during which wildland fire are likely to occur, spread and affect resources value sufficient to warrant organized fire management activities.

Fire weather
Weather conditions which influence fire ignition, behavior and suppression.

Fire weather planning forecast (FWF)
A forecast, issued daily during the fire season, that is intended for planning purposes by land management agencies. Also called routine fire weather forecast or simply fire weather forecast.

Fire weather service area
A geographical area of responsibility for which the local National Weather Service office provides fire weather products.

Fire weather watch
A NWS product used to alert fire fighting officials of a potential critical fire weather situation.

Forecast periods

Today	Sunrise to sunset
This afternoon	Noon to 6 pm
Tonight	Sunset to sunrise
Tomorrow	6 am to 6 pm of the following day

Free-air wind
The wind above ground level and not influenced by terrain, vegetation, etc.

Fuel
Combustible material.

Fuel moisture
The amount of water in a fuel, expressed as a percentage of the ovendry weight of that fuel.

Fuel moisture indicator stick
A specially prepared stick of known dry weight continuously exposed to the weather and periodically weighed to determine changes in moisture content as an indication of moisture changes in wildland fuels.

Haines Index (HI)
An atmospheric index used to indicate the potential for wildfire growth by measuring the stability and dryness of the air.

Humidity recovery
The change in relative humidity over a given period of time generally between late evening and sunrise.

Incident Meteorologist (IMET)
A specially trained meteorologist who provides site specific weather forecasts and information to fire fighting field personnel.

Inversion
An increase of temperature with height in the atmosphere.

Keetch-Byram Drought Index (KBDI)
A drought index specifically for fire management applications. It has a numerical range from 0 (no moisture deficiency) to 800 (maximum drought).

Light fuels
See fine fuels.

Lightning Activity Level (LAL)
A number, on a scale from 1 to 6, which reflects frequency and character of cloud-to-ground lightning. The scale from 1 to 5 deal with wet thunderstorms with 5 representing numerous thunderstorms with frequent lightning. 6 represents dry lightning.

Live fuel moisture
Ratio of the amount of water to the amount of dry plant material in living plants.

Micro-Remote Environmental Monitoring System (MICRO-REMS)
A mobile weather monitoring station.

Mid-flame wind
The wind that acts directly on the flaming fire front at a level one-half the flame height.

Mixing height
The depth measured from the surface in which vigorous atmospheric mixing occurs. The mixing height is found at the base of an inversion.

Moisture of extinction
The fuel moisture content at which the fire will not spread.

National Fire Danger Rating System (NFDRS)
The National Fire Danger Rating System is an assessment of wildfire danger at key points throughout the United States. “Fire danger” in NFDRS parlance, means a daily evaluation of the potential for wildfire ignition, growth and intensity over a broad sampling area. NFDRS takes into account many different vegetative types throughout the United States, their annual growth cycles, seasonal climate trends, local topography, fuels, and the effect of daily weather changes. Fire managers receive numeric output that suggests the severity of fire danger. In general, one or more fire weather observation sites are carefully located in the forest that will represent the worst conditions. Observations are taken once per day. Ideally, the NFDRS weather observations are taken at the hottest, driest and windiest time of the afternoon. This is because NFDRS is supposed to model the “worst case” fire conditions possible during the day. The ideal site would be one on a south and west facing aspect with no nearby obstructions. In reality, few locations meet these stringent criteria. The NFDRS is not intended to be “site specific” like the Fire Behavior Prediction System but rather a general overview of fire danger. Effective fire suppression planning depends heavily on NFDRS because it is an objective tool for predicting the difficulty of suppressing a wildfire.

National Interagency Fire Center (NIFC)
A facility located in Boise, ID, jointly operated by several federal agencies, dedicated to coordination, logistical support and improved weather services in support of fire management operations throughout the United States.

One-hour fuel moisture
Moisture content of fine fuels.

One-hundred hour fuel moisture
The moisture content of dead fuels which have diameters between 1” and 3”.

One-thousand hour fuel moisture
The moisture content of dead fuels which have diameters between 3” and 8”.

Palmer Index
A long-term drought index which measures the moisture supply. The index is used primarily for agricultural and hydrologic concerns since it deals with evapotranspiration, soil recharge, runoff and moisture loss from the surface layer. +4 or higher means extremely wet while -4 or less means extreme drought.

Prescribed burn
Controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions, which allows the fire to be confined to a predetermined area, and produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives.

Presuppression
Activities in advance of fire occurrence to ensure effective suppression action. These activities include planning the organization, recruiting and training, procuring equipment and supplies, maintaining fire equipment and fire control improvements and negotiating cooperative and/or mutual aid agreements.

Probability of Precipitation (PoP)
The likelihood of a precipitation event occurring at any given point in the forecast area. A precipitation event is the occurrence of a measurable amount (0.01 inch or greater) of liquid moisture falling during a specific period in the forecast area. As guidance, an expression of uncertainty and areal qualifying terms would have the following relationship to POP values...

POP Statement Value	Expression of Uncertainty	Equivalent Areal Qualifier
<20%	slight chance	isolated, few
20%	slight chance	few, widely scattered
30-40%	chance	scattered
50%	good chance	scattered
60-70%	likely	numerous
80-100%	no remark	no remark

Red flag warning
A National Weather Service product that is issued when red flag conditions (i.e., a critical fire weather situation) are expected.

Relative humidity
The ratio of the amount of moisture in the air to the maximum amount of moisture that air would contain if it were saturated.

Resource Ordering and Status System (ROSS):
The National Interagency Resource Ordering and Status System (ROSS) project is a National Wildfire Coordinating Group (NWCG) [web site] sponsored information systems development project. ROSS is a computer software program which automates the resource ordering, status, and reporting process.

Remote Automatic Weather Station (RAWS)
RAWS is a type of weather station which automatically observes, processes, and stores local weather data for subsequent transmission to the GOES satellite.

Six-foot wind
See eye-level wind.

Sky cover

Clear	Zero to 1/10 opaque cloud cover.
Mostly Sunny	1/10 to 2/10 opaque cloud cover. The prevailing condition is sunny, but some clouds may be present either over a portion of the area or for a short time over the entire area.
Fair	Less than 4/10 opaque cloud cover. No precipitation. No extremes in weather, visibility, temperature, or wind.
Partly cloudy/partly sunny	3/10 to 6/10 opaque cloud cover.
Mostly cloudy/considerable cloudiness	7/10 to 8/10 opaque cloud cover. Cloudiness will be subject to some variability in amount or location.
Cloudy	9/10 or greater opaque cloud cover. The sky is essentially covered throughout the forecast period.

Spot forecast
A specific weather forecast issued for a particular fire at a specific location.

Ten-hour fuel moisture
The moisture content of dead fuels which have diameters between ¼" and 1".

Transport winds
The mean wind speed and direction of all winds between the surface and mixing height.

Transport winds at 500 meters
The forecast transport winds at the time in which the mixing height is expected to reach 500 meters.

Twenty-foot wind
Wind observed at regular RAWS/FTS observation stations, typically forecast by meteorologists, and influenced somewhat by vegetation and terrain. These winds are evaluated at either 20 feet above the surface or 20 feet above a solid layer of vegetation.

User agency
Any agency that relies on fire weather forecast products from the National Weather Service.

Weather Information and Management System (WIMS)
An interactive computer system designed to accommodate the weather information needs of federal and state natural resource management agencies.

Wetting rain
A widespread rain that over an extended period of time significantly reduces fire danger. Usually greater than 0.10".

Wildland
An area in which development is essentially non-existent.

Appendix 5: Internet Links

National Weather Service Links:
Interagency Agreement
Southern Region Fire Weather
National Fire Weather Page: Red Flag Status
Storm Prediction Center: Outlook for Critical Fire Areas
Climate Prediction Center Forecasts: Medium and Long Range WX Outlooks

National and Regional Fire Weather Links:
Texas Interagency Coordination Center
Texas Forest Service
TICC Predictive Services
National Interagency Fire Center
Southwest Area Coordination Center
Southern Area Coordination Center
USDA Forest Service Fire Site
National Park Service Fire Site
U.S. Fish & Wildlife Service Fire Site
USDA Wildland Fire Assessment System

Miscellaneous Links:
Palmer Drought Index
Precipitation needed to bring the Palmer Drought Index to near normal

Appendix 6: Agency Signatories

NWS Signatories:

Monte Oaks
Austin/San Antonio NWS Office

Paul Witsaman
NWS Southern Region Headquarters

NWS Signatories can reached at: sr-srh.txfwop@noaa.gov

Customer Agency Signatories:

Forest Service:

Ron Bertsch
US Forest Service, Lufkin

Tom Spencer
Texas Forest Service, College Station

National Park Service:

Joe Perez
US Fish and Wildlife Service/National Park Service

Texas Interagency Coordination Center:

Cynthia Foster
Texas Forest Service, College Station/Lufkin

US Fish and Wildlife:

Mark Ruggiero
US Fish and Wildlife Service